# 2012 ANNUAL MONITORING NETWORK PLAN FOR THE NORTH CAROLINA DIVISION OF AIR QUALITY

#### **VOLUME 2**

# SITE DESCRIPTIONS BY METROPOLITAN STATISTICAL AREA

#### G. THE WILMINGTON MONITORING REGION



July 2, 2012

North Carolina Division of Air Quality A Division of the North Carolina Department of Environment and Natural Resources Mail Service Center 1641 Raleigh, North Carolina 27699-1641

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#### G. The Wilmington Monitoring Region

The Wilmington Monitoring Region, shown in Figure G1, consists of three sections: (1) the Wilmington Metropolitan Statistical Area (MSA) (Brunswick, New Hanover, and Pender Counties), (2) the Jacksonville MSA (Onslow County), and (3) the Non-MSA Portion of the Wilmington Monitoring Region (Carteret, Columbus, and Duplin Counties).



Figure G1. The Wilmington Monitoring Region
The red dots show the approximate locations of most of the monitoring sites in this region.

#### (1) The Wilmington MSA

The Wilmington MSA consists of three counties: Brunswick, New Hanover, and Pender. The major metropolitan area is the City of Wilmington. The North Carolina Division of Air Quality (NC-DAQ) currently operates two criteria pollutant monitoring sites and one urban air toxics monitoring site in the Wilmington MSA. The criteria pollutant monitoring sites are the New Hanover site and the Castle Hayne site. The urban air toxics monitoring site is the Battleship site.



Figure G2. Castle Hayne Ozone and Fine Particle Monitoring Site (37-129-0002)

At the **Castle Hayne** (37-129-0002) site the NC-DAQ operates an ozone monitor, a one-in-three day fine particle monitor, and a continuous fine particle monitor. Monitoring information for the site is summarized in Table G1. A picture of the site as well as views looking north, northeast, east, southeast, south, southwest, west, and northwest are provided in Figure G2 through Figure G10. The NC-DAQ completed the Beta Attenuation Monitor (BAM) study in December 2011. At that time the BAM was shut down and the 1-in-3 day fine particle Federal Reference Method (FRM) monitor became a SLAMS.

Table G1. Site Table for Castle Hayne

Table G1. S				stle Hayne									
Site Name:		Hayne					S Site Iden	tific	cation	Numb	er:	37-12	9-0002
Location:	6028		olly Shelter Road, Castle Hayne, North Carolina										
MSA:			_	ton,NC					SA #:			9200	
Latitude		34.36			ngitud	e -77.	838611	Da	atum:			WGS	84
Elevation		12 m	eter	'S			T				_		
							Method	_	_	Sam	-	Samp	oling Schedule
D 4 N	,	3.7.41					Referen	ce II	D	Dura	itio		
Parameter N	ame	Meth								n			
0				ental With Ult	tra Vio	let	FOOL		0.47	4 77		,	1 . 0 . 1 . 21
Ozone	1			etry (047)	10.5.0	1	EQOA-0	880	-047	1-Ho	ur		1 to October 31
PM 2.5 Local	Į.			Iodel 2025 Pl		1	DEDC 04	00	110	24 11			Third Day,
Conditions	2-1-1			- Gravimetr			RFPS-04	98-	118	24-H	our	Y ear	Round
PM2.5 Raw I				EOM w/VSC			Nata Da	c					
Acceptable P AQI & Speci				on Factor (71 v/VSCC w/C			Not a Re Method	iere	ence	1-Ho	1100	Voor	Round
					orrection	on ractor	Methou			1-110	uı		
Date Monito Date Monito				Ozone PM 2.5 Loca	1 Can d	:4:							ry 1, 1979
Date Monito				PM 2.5 Loca PM2.5 Raw l			DM2.5.A.O.I.	0- C	maaiati	on.			1, 2002 ary 1, 2006
								$\frac{\alpha}{\alpha}$			4.	Janua	, ,
Nearest Roa	a: H	iony Sr	ielte	er Road	Tra	ffic Count:	2400	- 1		of Cou	int:		2009
Donome star N	lom -		D:	atamaa ta D -	ad	Dima at!	to Dood		onitor		C4~4	om c 4	of Dumeson
Parameter N	аше		IJΙ	stance to Ro	au	Direction	i to Koad	13	ype				of Purpose
Ozone				60		No	orth	SL	LAMS			time AQI reporting. pliance w/NAAQS.	
PM 2.5 Local	Condi	tions							AQI	report	ing. Compliance		
				60		No	orth	SL	LAMS		w/N	NAAQS.	
PM2.5 Raw I													
Acceptable P	M2.5 A	.QI					Non-						
& Speciation				60		No	orth		egulato	•	Real	eal-time AQI reporting.	
									ıitable				
			Monitoring								o Move or		
Parameter N	ame			ojective							Cha		
Ozone				pulation Exp		Urban		Yes			None		
PM 2.5 Local		tions	Po	pulation Exp	osure	Neighbor	eighborhood		Yes		None		
PM2.5 Raw I													
Acceptable P	M2.5 A	.QI	_										
& Speciation			Po	pulation Exp		Neighbor			No		None		
				Meets Part		Meets Pa			eets Pa				Meets Part 58
D 4 3	r		Appendix A					Appendix D Requirements				Appendix E	
Parameter N	ame			Requireme	ents	Requirer		Ke	equire			<u> </u>	Requirements
Ozone			Yes			es	Yes No requirements				Yes		
PM 2.5 Local Conditions PM2.5 Raw Data/ Acceptable		1	Yes		Y	es		No re	quiren	nents		Yes	
				Vas		No/not	aniral ta		Ma	.a.i	aanta		Vaa
PM2.5 AQ				Yes			equired to	<u> </u>	_	quiren		20	Yes
Parameter N	ame		Pr	obe Height (	m)		to Support	Į.	_	ance to		es	Obstacles
Ozone PM 2.5 Local Conditions			3.8			meter			>20 m			None	
		tions		2.3		> 2	2 meters		1	>20 m	eters		None
PM2.5 Raw I		0.1											
Acceptable P	IVI2.5 A	.ŲI		2.2		. ,	matara			> 20	atora		None
& Speciation				2.3		> .	2 meters			>20 m	eters		None



Figure G3 Looking North from the Castle Hayne Site



Figure G4. Looking Northwest from the Castle Hayne Site



Figure G5. Looking West from the Castle Hayne Site



Figure G6. Looking Southwest from the Castle Hayne Site



Figure G7. Looking Northeast from the Castle Hayne Site



Figure G8. Looking East from the Castle Hayne Site



Figure G9. Looking Southeast from the Castle Hayne Site



Figure G10. Looking South from the Castle Hayne Site

The NC-DAQ continues to follow the progress of the Titan cement facility closely. If Titan is constructed, the NC-DAQ will reassess the site after Titan begins operation to ensure the site continues to meet siting criteria for the purposes of the monitors located at the site.

According to the 2010 census, the population of the Wilmington MSA crossed 350,000, requiring a second ozone monitor for the MSA if the ozone design value is above 85 % of the National Ambient Air Quality Standards. The design value for 2009-2011 for Wilmington is at 83 % of the standard so a second ozone monitor is not needed at this time. In addition, the NC-DAQ received a waiver for a second ozone monitor for the MSA from the EPA on November 9, 2011. The waiver is valid until the next 5-year assessment is due in 2015. The waiver is shown in Figure G14.

At the **New Hanover** (37-129-0006) site the NC-DAQ operates a sulfur dioxide monitor. At the beginning of 2012 the shelter was moved approximately 200 feet across the field to maintain access to the site after the host facility closed. A picture of the site as well as views looking north, northeast, east, southeast, south, southwest, west, and northwest are provided in Figure G11 through Figure G20.



Figure G11. New Hanover Sulfur Dioxide Monitoring Site (37-129-0006)



Figure G12. Looking North from the New Hanover Site



Figure G13. Looking Northeast from the New Hanover Site



#### UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

NOV - 9 2011

Ms. Shelia Holman
Director
Division of Air Quality
North Carolina Department of
Environment and Natural Resources
1641 Mail Service Center
Raleigh, North Carolina 27699-1641

Dear Ms. Holman:

In a December 21, 2010, letter to you, the U.S. Environmental Protection Agency approved a waiver of the requirement that the state operate two ozone monitors in the Wilmington Metropolitan Statistical Area (MSA). At that time, EPA stated that it would re-evaluate the appropriateness of the waiver once EPA completed its reconsideration of the Ozone National Ambient Air Quality Standard (NAAQS).

On September 22, 2011, the Agency completed its reconsideration of the Ozone NAAQS and announced that the NAAQS would not change. This action left the Ozone NAAQS, which was promulgated in 2008, at a level of 0.075 parts per million (ppm).

Because the Wilmington MSA has a low risk for exceeding the 0.075 ppm NAAQS due to ambient air ozone concentrations which have been trending lower (i.e., decreasing design value), sea breezes, attainment status, and a population total that is only slightly over the threshold requirement for a second ozone monitor, EPA believes that the waiver of the second monitor is appropriate. The waiver is in effect until the next 5-year network assessment is completed and approved in 2015.

If you have any questions relating to this matter, please contact Katherine Snyder of my staff at (404) 562-9840.

Sincerely,

Gwendolyn Keyes Fleming

Regional Administrator

cc: Archie Lee, SESD

NOV 1 6 2011

AIR QUALITY DIVISION DIRECTORS OFFICE

Internet Address (URL) • http://www.epa.gov

Figure G14. Letter from the EPA approving a waiver for a second ozone monitor for the Wilmington MSA



Figure G15. Looking Northwest from the New Hanover



Figure G16. Looking West from the New Hanover Site



Figure G17. Looking Southwest from the New Hanover



Figure G18. Looking East from the New Hanover Site



Figure G19. Looking Southeast from the New Hanover Site



Figure G20. Looking South from the New Hanover Site

The New Hanover site was established in 1994 to replace the Acme-Delco site in Columbus County, which was shut down in 1995. The Acme-Delco site was located about 15 miles west of the New Hanover site. The site was moved because industrial emissions had decreased in Columbus County and the measured sulfur dioxide concentrations had dropped over the previous 10 years. During the time when both monitors operated, the New Hanover site consistently measured higher concentrations of

sulfur dioxide. On January 1, 2013, the New Hanover site will become the required Population Weighted Emission Inventory site for the Wilmington MSA.



Figure G21. The Battle Ship Urban Air Toxics Monitoring Site

At the Battle Ship (37-129-0010) site the NC-DAQ operates a year round air toxics volatile organic compound sampler. Samples are collected in stainless steel canisters and sent to the Toxics Protection Branch laboratory where they are analyzed for 68 compounds using the Compendium Method for Toxic Organics 15. A picture of the site as well as views looking north, northeast, east, southeast, south, southwest, west, and northwest are provided in Figure G21 through Figure G29.



Figure G22. Looking North from the Battleship Site



Figure G23. Looking Northwest from the Battleship Site



Figure G24. Looking Northeast from the Battleship Site



Figure G25. Looking East from the Battleship Site



Figure G26. Looking West from the Battleship Site



Figure G27. Looking Southwest from the Battleship Site



Figure G28. Looking Southeast from the Battleship Site



Figure G29. Looking South from the Battleship Site

In 2008 EPA expanded the **lead monitoring** network to support the lower lead National Ambient Air Quality Standard (NAAQS) of 0.15 micrograms per cubic meter promulgated in 2008. The 2010 changes to the lead monitoring requirements focuses monitoring efforts on fence line monitoring located at facilities that emit 0.5 tons or more of lead per year and at National Core (NCore) monitoring sites. These changes to the lead monitoring network requirements do not affect the Wilmington MSA. The MSA does not have an NCore monitoring site and it does not have any permitted facilities located within its bounds that emit more than 0.5 tons per year of lead.<sup>1</sup>

Any changes to **ozone monitoring** requirements will not affect the Wilmington MSA because it already has an ozone monitor for urban population exposure monitoring and does not have any Class I Areas. However, if the ozone standard is lowered, the design value for Wilmington may exceed the 85 % of the NAAQS threshold which would require a second ozone monitor for the MSA in 2016.

The Wilmington MSA is not affected by the 2010 **nitrogen dioxide monitoring** requirements. It is too small to require area-wide monitors and does not have any roadways with average annual daily traffic above the threshold for near roadway monitoring. The Wilmington MSA will not be affected by the 2010 **sulfur dioxide monitoring** requirements. The existing sulfur dioxide monitor at the New Hanover site will meet the Population Weighted Emission Index monitoring requirements for the MSA. This MSA

1

<sup>&</sup>lt;sup>1</sup> Data obtained from the NC-DAQ emission inventory database.

will also not be affected by the **changes to the carbon dioxide monitoring** requirements because the population is too small.

#### (2) The Jacksonville MSA

The Jacksonville MSA consists of Onslow County. The principal city is Jacksonville. The NC-DAQ currently does not operate any monitoring sites in the Jacksonville MSA. The Jacksonville particlemonitoring site was shut down on December 31, 2007, because the measured concentrations were less than 80 % of the National Ambient Air Quality Standards.

Changes to the **lead monitoring network** requirements in 2010 did not affect the Jacksonville MSA. Although the MSA does not have an NCore monitoring site, it had a permitted facility located within its bounds that emitted 0.5 tons or more per year of lead in 2009. However, lead emissions at Camp LeJeune in 2010 were below the 0.5 ton threshold. The EPA concurred that actual emissions from Camp LeJeune were less than 0.5 tons and did not require monitoring at the fence line of the facility.

Changes to the **ozone monitoring requirements** could affect the Jacksonville MSA if the EPA decides to require monitoring in urban areas without design values. Its population is above the threshold for requiring population exposure monitoring in urban areas but monitoring is not required because it does not have an ozone design value. Currently, the NC-DAQ does not monitor for ozone in Jacksonville because the ozone levels measured by the Castle Hayne monitor in New Hanover County indicate that the ozone concentrations on the coast are currently around 85 % of the NAAQS. The Jacksonville MSA would not be affected by rural ozone monitoring requirements because there are no Class I areas in the MSA.

The Jacksonville MSA is not impacted by the 2010 **nitrogen dioxide monitoring** requirements. It is too small to require area-wide monitors and does not have any roadways with average annual daily traffic above the threshold for near roadway monitoring. The Jacksonville MSA is also not impacted by the 2010 **sulfur dioxide monitoring** requirements because there are no large sources of sulfur dioxide in the MSA and the population is not large enough to require a PWEI monitor. This MSA will also not be impacted by the **proposed changes to the carbon dioxide monitoring requirements** because the population is too small.

#### (3) The Non-MSA Portion of the Wilmington Monitoring Region

The Non-MSA Portion of the Wilmington Monitoring Region consists of three counties (Carteret, Columbus, and Duplin). This area does not have any MSAs; however, Carteret County is part of the New Bern Micropolitan Statistical Area. The NC-DAQ currently operates one monitoring site in this area at Kenansville shown in Figure 30.

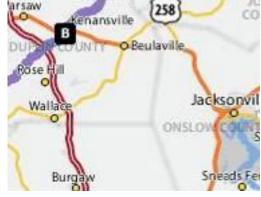


Figure 30. Monitoring Site Location

B is the
Kenansville
particle site.
The
neighborhood
scale (0.5 to 4
Km) is
approximately
represented by
the black
square.

At the **Kenansville** general-background monitoring site in Duplin County the NC-DAQ operates a one-in-three day fine particle FRM monitor, a continuous fine particle beta attenuation monitor (BAM), and a rotating one-in-six day high volume  $PM_{10}$  monitor that operates every third year. Late in 2012 or early 2013, the FRM monitor may be shut down and replaced by the BAM, if the BAM and FRM values agree well. A picture of the site as well as views looking north, northeast, east, southeast, south, southwest, west, and northwest are provided in Figure G31 through Figure G39.



Figure G31. Kenansville Particle Monitoring Site



Figure G32. Looking North from the Kenansville Site

Figure G33. Looking Northwest from the Kenansville Site



Figure G34. Looking Northeast from the Kenansville Site

Figure G35. Looking East from the Kenansville Site



Figure G36. Looking West from the Kenansville Site



Figure G37. Looking Southwest from the Kenansville Site



Figure G38. Looking Southeast from the Kenansville Site



Figure G39. Looking South from the Kenansville Site

The NC-DAQ requires  $PM_{10}$  data in the coastal area for prevention of significant deterioration (PSD) modeling for industrial expansion. Because the NC-DAQ shut down the  $PM_{10}$  monitoring site in Jacksonville on December 31, 2007, the NC-DAQ began manual one-in-six day  $PM_{10}$  monitoring at the Castle Hayne site in February 2008 to provide the necessary  $PM_{10}$  data for PSD modeling for the coastal area. However, a wildfire next to the site forced the NC-DAQ to shut down the monitor on March 31, 2008. After the wildfire was extinguished, the NC-DAQ decided not to resume  $PM_{10}$  monitoring at Castle Hayne because of the pending construction of the Titan Cement Facility across the street from the Castle Hayne site. Modeling results indicate that Titan could contribute over 10 % of the NAAQS to the  $PM_{10}$  concentrations measured at Castle Hayne, making Castle Hayne an unsuitable site for obtaining data to use for PSD modeling. As a result the  $PM_{10}$  monitor was located at Kenansville in second quarter 2009. At the end of 2010, the NC-DAQ began operating the monitor on a one-in-three year schedule and made the site one of six rotating background  $PM_{10}$  sites for the state.

The 2010 **lead monitoring** requirements did not affect this area because there are no NCore monitoring stations or permitted facilities that emit 0.5 tons or more of lead per year located here.<sup>2</sup> Any new **ozone monitoring** requirements should also not affect this area. There is no MSA here so population exposure monitoring requirements for urban areas do not apply and rural ozone monitoring requirements will not apply because there are no Class I areas here. The 2010 **nitrogen dioxide** monitoring requirements also do not affect this area. It is too small to require area-wide monitors and does not have roadways with average annual daily traffic above the threshold for near road monitoring. This area will also not be affected by the 2010 **sulfur dioxide monitoring** requirements because there are no large sources of

G14

<sup>&</sup>lt;sup>2</sup> ibid.

sulfur dioxide in this area and the population is too small to require a PWEI monitor. The changes to the **carbon dioxide monitoring** requirements will not impact this area because the population is too small.

### **Appendix G.1 Annual Network Site Review Forms for 2011**

Castle Hayne

New Hanover in Wilmington

Battle Ship in Wilmington (No 2011 Site Review Conducted)

Kenansville

#### **Site Information**

Region_WIRO	Site Name Castle H	ayne	AQS Site # 37-129 - 0002  City Castle Hayne				
Street Address- 1	Holly Shelter Road						
Urban Area Not in a	n Urban Area   Core-	based Sta	tistical Area Wilm	ington, NC			
	Enter Exact		]:				
Longitude <u>77.83886</u>	94 Latitude 34.36	434722	Metho	od of Measuring			
In Decimal Degrees	In Decimal Degrees		Other (explain)	Explanation: Google Earth			
Elevation Above/below 1	Mean Sea Level (in meters	)	-	8			
Name of nearest road to inle Comments:  Distance of site to nearest n Name of nearest major road Comments:	et probe Holly Shelter najor road (m) 60.00 Directio Holly Shelter Road	Road on from site	to nearest major road 1	<b>3</b> 9			
Site located near electrical s	substation/high voltage power	lines?		Yes _			
Distance between site and of Explain any sources of pe	t power pole w/transformer	(m Directive distribution)	n) 130 Direction tion from site to water to loose bulk storage, st	on to RR NA on NE ower NA acks, vents, railroad tracks,			
ANSWER ALL APPLIC	ABLE QUESTIONS:  Monitoring Objective		Scale	Site Type			
NA   SO₂ (NAAQS)   SO₂ (trace-level)   NO₃ (NAAQS)   HSNO₃   NH₃   Hydrocarbon   Air Toxics   HSCO (Not Micro)   CO (trace-level)	General/Background Highest Concentration Max O3 Concentration Population Exposure Source Oriented Transport Upwind Background Welfare Related Impacts		Micro Middle Neighborhood Urban Regional	SLAMSOzone  NCORE   SPM   SPM/OPN   NONREGULATORY			
Probe inlet height (from gro Distance of probe inlet from Actual measured distance of Distance of probe inlet from Is probe > 20 m from the new *Is probe > 10 m from the new *Distance from probe to tree	n horizontal (wall) and/or vert rom probe to supporting struct n other monitoring probe inlet earest tree drip line? Yes nearest tree drip line if tree ac	ical (roof) s cure (meters s > 1 m? 8No s as an obst	upporting structure > 1 n  1.0  (answer *'d questions) ruction? Yes	Yes⊠ No□NA□			
*Height of tree (m)			N- 101				
*Identify obstacle D *Is distance from inlet prob	ir flow? *Yes [ (answer *'d istance from probe inlet (m) _ se to obstacle at least twice the t traffic lane (m) 59 Direct	Direct height that	tion from probe inlet to the obstacle protrudes a	bove the probe? Yes 🔲 No 🗀			

Parameters	Monitoring Objective	Scale	Scale Site Type				
NA □CO (Micro Only)	Highest Concentration Population Exposure Source Oriented Transport Welfare Related Impacts	□Miere	SLAMS SPM SPM/OPN NONREGULATORY				
Distance of probe inlet fro Actual measured distance Distance of probe inlet to	from probe inlet to ground (meters) _ om horizontal (wall) and/or vertical (re- from probe to supporting structure (m nearest intersection > 10 m?	of) supporting structure	Yes No No				
Is probe > 20 m from the  *Is probe > 10 m from the  *Distance from probe to the  *Height of free (m)	nearest traffic lane 2 - 10 m? nearest tree drip line? Yes 8 %N e nearest tree drip line if tree acts as an ree (m)	obstruction? Yes Direction from	*No 🗆				
*Identify obstacle *Is distance from inlet pro	o air flow? *Yes ((answer *'d questi Distance from probe inlet (m) (be to obstacle at least twice the height est traffic lane (m) (Direction fi	Direction from probe inle t that the obstacle protruc	les above the probe? Yes 🔲 No 🔲				
Parameters	Monitoring Objective	Scale	Site Type				
NA NO <sub>y</sub> (trace-level)	General/Background Highest Concentration Max O3 Concentration Population Exposure Source Oriented Transport Upwind Background Welfare Related Impacts	Micro	NCORE				
Probe inlet height (from g Actual measured distance	round) 10-15 m? from probe inlet to ground (meters)		Yes No				
Actual measured distance	om horizontal and/or vertical supporting from probe to supporting structure (m om other monitoring probe inlets > 1 m	elers)	Yes No NA Yes No NA				
*Is probe > 10 m from the	nearest tree drip line? Yes = *N e nearest tree drip line if tree acts as an ree (nt)	obstruction? Yes	*No 🗆				
*Identify obstacle *Is distance from inlet pro	o air flow? *Yes [ (answer *'d questi Distance from probe inlet (m)	Direction from probe inle t that the obstacle protruc	les above the probe? Yes 🔲 No 🔲				

Parameters	Monitoring Objective	Scale	Site Type
NA  NO₂ (Near Road only)  CO (Near Road only)	Highest Concentration Population Exposure Source Oriented Transport Welfare Related Impacts	Micro	SLAMS SPM NONREGULATORY
Distance of probe inlet from h Actual measured distance from	d) 2-15 m? Yes No No orizontal (wall) and/or vertical (room probe to supporting structure (mether monitoring probe inlets > 1 m	of) supporting structure > eters)	하다 가게 하는데 보니 얼마나가 하는데 모든데 되었다. 이 사람들은 이 사람들은 이 사람들은 모든 모든 모든 그는데 다른 사람들은 그는데 그렇게 되었다.
*Is probe > 10 m from the nea *Distance from probe to tree ( *Height of tree (m)	est tree drip line? Yes "No rest tree drip line if tree acts as an m)	obstruction? Yes Direction from	"No 🔲
*Identify obstacle Dista *Is distance from inlet probe t	flow? *Yes [] (answer e'd questic ance from probe inlet (m)Dir o obstacle at least twice the height affic lane (m) Direction	ection from probe inlet to that the obstacle protrud	es above the probe? Yes 🔲 No 🔲
Parameters	Monitoring Objective	Scale	Site Type
Air flow > 200 L/min	Highest Concentration Population Exposure Source Oriented Background Transport Welfare Related Impacts	Micro	NCORE
	id)		□>15 m
	tal (wall) and/or vertical (platform n probe to supporting structure (mo		ture > 2 m? Yes No
Actual measured distance bety	PM-10, TSP or Pb sampler inlets = veen collocated probes (meters) _ lume inlet and any other high or lo		
Is probe > 20 m from the near	est tree drip line? Yes 🔲 *No	(answer *'d question	ns)
*Distance from probe to tree ( *Height of tree (m)	rest tree drip line if tree acts as an m)	Direction from	
*Identify obstacle Dista *Is distance from inlet probe t	flow? *Yes [] (answer *'d questic ince from probe inlet (m)Dire to obstacle at least twice the height affic lane (m)Direction	ection from probe inlet to that the obstacle protrud	es above the probe? Yes 🔲 No 🔲

Parameters	Monitoring Objective	Scale	Site Type
□NA	General/Background	☐Micro	⊠SLAMS
Air flow < 200 L/min	Highest Concentration	☐Middle	PM2.5
PM2.5	☑Population Exposure	☑Neighborhood	□ NCORE
PM10-2.5	Source Oriented	Urban	SPM
PM10 Lead (PB)		Regional	NONREGULATORY
PM2.5 Cont. (TEOM)	Transport		TEOM
☐ PM2.5 Cont. (BAM) ☐ PM2.5 Spec. (SASS)	Upwind Background		
PM2.5 Spec. (URG)	Welfare Related Impacts		
PM2.5 Cont. Spec.			
Probe inlet height (from gro	und) 🔲 < 2 m 🔲 2-7m	_ 🗆 7-15 m	> 15 m
	om probe inlet to ground (meters) 2		SANDARONE MADE WATER
	ontal (wall) and/or vertical (platform or		m? Yes No
site = 1 m or greater?	ny low volume monitor and any other lo	w volume monitor at the	Yes ☑ No ☐ NA ☐
	lume monitor inlets and any Hi-Volume	PM-10 or TSP inlet = 2 m	Yes□ No□ NA 🖾
or greater?		- T	1es L No L NA M
TEOM, BAM & TEOM) Lo	tors (Two FRMs, FRM & BAM, FRM &	<sup>®</sup> Yes <b>⊠</b> (answer	**d questions) No 🗌 NA 🔲
	ed PM 2.5 sampler inlets = 1 to 4 m?	Yes □ No 🛛 (	Five actual (meters)5.2
*Are collocated PM2.5 sam	pler inlets within 1 m vertically of each	other? Yes ⊠ No 🔲 🤇	Give actual (meters)
	llocated with a SASS monitor at the site		
	ed speciation sampler inlets = 1 to 4 m		Give actual (meters) Give actual (meters)
Est if the continue	sampler inlets within 1 m vertically of e		
Is a low-volume PM10 mon to measure PM10-2.5?	itor collocated with a PM2.5 monitor at	the site   *Yes ∐ (answer	*'d questions) No ☐ NA 🛛
*Are collocated PM10 and I	ed PM10 and PM2.5 inlets for PM10-2.5 PM2.5 sampler inlets within 1 m vertical	lly of each other? Ye	s No
50.	arest tree drip line? Yes 🛛 "No 🗌	13	
	earest tree drip line if tree acts as an obs		
*Height of tree (m)	e (m)	Direction from probe t	o tree
	ir flow? *Yes 🔲 (answer *'d questions)	No 🛮	
*Identify obstacle Di	stance from probe inlet (m)Dire	ction from probe inlet to obsta	acle
*Is distance from inlet probe	to obstacle at least twice the height that	t the obstacle protrudes above	the probe? Yes 🛛 No 🗌
	traffic lane (m) 60 Direction from pr	obe to nearest traffic lane N	
RECOMMENDATIONS:			
	atus? Yes 🛛 *No 🗌 (answer *'d q	11 11 11 11 11 11 11 11 11 11 11 11 11	
	ejective? Yes (enter new objective		_) No ⊠-
	sentativeness? Yes [ (enter new sca	le	) No 🛛
*4) Relocate site? Yes [	_l No⊠		
Comments:			
Reviewer Tony Sab	netti	Dotal	December 28, 2011
500000000000000000000000000000000000000	SW (C.V.	0.00000	
Ambient Monitoring Coord	dinator Tony Sabetti	Date	December 28, 2011
Revised 2012-01-19			

#### Site Information

Region_WIRO Site Name New Hanover			r	AQS Site # 37-129 - 0006			
Street Addr	ess- 2400 Hwy	421 North	City w	City Wilmington			
Urban Area			ased Statistical A	rea Wilmington, NC			
	Ente	r Exact					
Longitude -	77.95663888	Latitude 34.2695	5555	Method of Measuring			
In Decimal Degre	es	In Decimal Degrees	GPS	Explanation:			
		ea Level (in meters)		2			
Name of nearest r	oad to inlet probe	US Highway 42	1ADT 21000	Year latest available 2009			
Comments:							
Distance of site to	nearest major ro	ad (m) 51.00 Direction from	m site to nearest major	rroad <u>W</u>			
Name of nearest n	najor road	ADT	Year				
Comments:							
Site located near e	lectrical substati	on/high voltage power lines	2	Yes ☐ No 🏻			
Distance of site	to nearest railro	ad track	(m) 185Directi	ion to RR E NA			
				rganiamonata			
		r pole w/transformer of water tower (m)		The state of the s			
				rage, stacks, vents, railroad tracks,			
		restaurants, and swimmi		ruge, sueks, vems, militais mieks,			
			9.				
<u>t</u>							
ANSWER ALL	APPLICABLE		_				
Parameter	s	Monitoring Objective	Scale	Site Type			
□NA	□Gd	meral/Background	☐Micro_	✓SLAMS			
SO <sub>2</sub> (NAAC	(S)	ghest Concentration	☐Middle				
SO <sub>2</sub> (trace-l NO <sub>x</sub> (NAA	0.65	ax O3 Concentration	Neighborhood	The state of the s			
HSNO <sub>v</sub>		pulation Exposure	Urban_				
□°,		urce Oriented ansport	A CONTRACTOR OF THE PARTY OF TH				
☐ NH <sub>3</sub>		wind Background	Regional	NONREGULATORY			
Hydrocarbo		elfare Related Impacts					
☐ Air Toxics ☐ HSCO (Not	107 BF	1					
CO (trace-le							
Probe inlet height	(from ground) 2	-15 m? Yes X No □	Give actual measure	sured height from ground (meters) 4			
				ture > 1 m? Yes ☑ No ☐			
		be to supporting structure (					
Distance of probe	inlet from other	monitoring probe inlets > 1	m?	Yes ☑ No ☐ NA ☐			
Is probe > 20 m fi	om the nearest tr	ee drip line? Yes 🛛 🤲	No ∐ (answer *'d qu	estions)			
*Is probe > 10 m	from the nearest	tree drip line if tree acts as a	in obstruction? Yes	□ *No □			
*Distance from p	robe to tree (m)_		Direction	from probe to tree			
*Height of tree (n	1)			2000 110 000 000 1 WO 000 00 10 10 10 1			
Are there any obs	tacles to air flow	? *Yes 🔲 (answer *'d ques	tions) No 🛛				
*Identify obstacle	Distance	from probe inlet (m)	Direction from probe	inlet to obstacle			
				otrudes above the probe? Yes 🔲 No			
		lane (m) 51 Direction fr					

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Parameters	Monitoring Objective	Scale	Site Type
NA □CO (Micro Only)	Highest Concentration Population Exposure Source Oriented Transport Welfare Related Impacts	Micro	SLAMS SPM_OPN NONREGULATORY
Probe inlet height (from gr Actual measured distance	round) 2.5 - 3.5 m? from probe inlet to ground (meters)		Yes No
Distance of probe inlet fro Actual measured distance	m horizontal (wall) and/or vertical (re from probe to supporting structure (m	oof) supporting structure eters)	> 1 m? Yes  No
Distance of probe inlet to	nearest intersection > 10 m? nearest traffic lane 2 - 10 m? nearest tree drip line? Yes	o \ (answer *\d anestic	Yes No Yes No No
*Is probe > 10 m from the *Distance from probe to tr *Height of tree (m)	nearest tree drip line if tree acts as an ee (m)	obstruction? Yes Direction from	*No 🗌
*Identify obstacle I *Is distance from inlet pro	air flow? *Yes (answer *'d questi Distance from probe inlet (m) be to obstacle at least twice the height st traffic lane (m) Direction fr	Direction from probe inle t that the obstacle protrue	des above the probe? Yes 🔲 No 🔲
Parameters	Monitoring Objective	Scale	Site Type
NA NO <sub>y</sub> (trace-level)	General/Background Highest Concentration Max O3 Concentration Population Exposure Source Oriented Transport Upwind Background Welfare Related Impacts	Micro	SLAMS NCORE SPM
Probe inlet height (from gr Actual measured distance			Yes No
	m horizontal and/or vertical supporting from probe to supporting structure (m	7/	Yes No
Distance of probe inlet fro	m other monitoring probe inlets > 1 m	17	Yes No NA
070	nearest tree drip line? Yes are *N nearest tree drip line if tree acts as an ee (m)	obstruction? Yes	
Are there any obstacles to  *Identify obstacle I  *Is distance from inlet pro	air flow? *Yes (answer *'d questi Distance from probe inlet (m) be to obstacle at least twice the height st traffic lane (m) Direction	Direction from probe inle t that the obstacle protrue	des above the probe? Yes 🔲 No 🗌

Parameters	Monitoring Objective	Scale	Site Type
NA  NO₂ (Near Road only)  CO (Near Road only)	Highest Concentration Population Exposure Source Oriented Transport Welfare Related Impacts	Micro	SLAMS SPM NONREGULATORY
Distance of probe inlet from h Actual measured distance from	d) 2-15 m? Yes No No orizontal (wall) and/or vertical (room probe to supporting structure (mether monitoring probe inlets > 1 m	of) supporting structure > eters)	경영 경우 (사이) 아이 아이트 100kg (100kg 100kg 1
*Is probe > 10 m from the nea *Distance from probe to tree ( *Height of tree (m)	est tree drip line? Yes "No rest tree drip line if tree acts as an m)	obstruction? Yes Direction from	"No 🔲
*Identify obstacle Dista *Is distance from inlet probe to	low? *Yes [ (answer °'d questic ince from probe inlet (m)Dir to obstacle at least twice the height affic lane (m) Direction	ection from probe inlet to that the obstacle protrude	es above the probe? Yes 🔲 No 🔲
Parameters	Monitoring Objective	Scale	Site Type
Air flow > 200 L/min PM10 STSP SP SP	Highest Concentration  Population Exposure  Source Oriented  Background  Iransport  Welfare Related Impacts	Micro	NCORE
Actual measured distance from Distance of inlet from horizon	d)	or roof) supporting struc	ture > 2 m? Yes No
Distance between collocated P Actual measured distance betw	M-10, TSP or Pb sampler inlets = reen collocated probes (meters) _ lume inlet and any other high or lo	2 to 4 m?	Yes No NA
*Is probe > 10 m from the nea	est tree drip line? Yes °No rest tree drip line if tree acts as an m)	obstruction? Yes	°No □
Are there any obstacles to air to all the state of the st	low? *Yes [ (answer *'d questic mee from probe inlet (m)Dire to obstacle at least twice the height affic lane (m) Direction	ection from probe inlet to that the obstacle protrude	es above the probe? Yes 🔲 No 🔲

Parameters	Monitoring Objective	Scale	Site Type
NA  Air flow < 200 L/min  □ PM2.5  □ PM10  □ PM10-2.5  □ PM10 Lead (PB)  □ PM2.5 Cont. (TBOM)  □ PM2.5 Cont. (BAM)  □ PM2.5 Spec. (SASS)  □ PM2.5 Spec. (URG)  □ PM2.5 Cont. Spec.	General/Background Highest Concentration Population Exposure Source Oriented Transport Upwind Background Welfare Related Impacts	Micro Middle Neighborhood Urban Regional	SLAMS NCORE SPM NONREGULATORY
Probe inlet height (from gro Actual measured distance fr Distance of inlet from horize Distance between inlets of a site = 1 m or greater? Distance between all low voor greater?	und)	roof) supporting structure > low volume monitor at the ne PM-10 or TSP inlet = 2 m	> 15 m
TEOM, BAM & TEOM) Lo *Distance between collocate	tors (Two FRMs, FRM & BAM, FRM scated at Site? ed PM 2.5 sampler inlets = 1 to 4 m? pler inlets within 1 m vertically of each	Yes No Yes No	r **d questions) No NA Give actual (meters)
* Distance between collocat  * Are collocated speciation	llocated with a SASS monitor at the site ed speciation sampler inlets = 1 to 4 m sampler inlets within 1 m vertically of itor collocated with a PM2.5 monitor at	i? Yes No ☐ each other? Yes No ☐	estions) No NA Give actual (meters) Give actual (meters) r *'d questions) No NA
*Distance between collocate *Are collocated PM10 and I	ed PM10 and PM2.5 inlets for PM10-2. PM2.5 sampler inlets within 1 m vertice arest tree drip line? Yes 70 °No	ally of each other? Y	es No No No
*Distance from probe to tree *Height of tree (m)	earest tree drip line if tree acts as an obe (m) ir flow? *Yes (answer *'d questions	Direction from probe	
*Is distance from inlet probe Distance of probe to nearest	stance from probe inlet (m)Direction obstacle at least twice the height the traffic lane (m) Direction from	at the obstacle protrudes above	re the probe? Yes 🔲 No 🗌
*2) Change monitoring ob	atus? Yes ☐ *No ☒ (answer *'d njective? Yes ☐ (enter new objective sentativeness? Yes ☐ (enter new sc ☐ No ☐	c	
Comments: Change	Monitoring Objective to Maximum C	oncentration	
Reviewer Tony Se	abetti		Date1/19/2012
Ambient Monitoring Coord	dinator Tony Sabetti		Date1/19/2012
Revised 2012-01-19			

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#### **Site Information**

Region_WIRO Site Name Kenansville			AQS Site # 37-61 - 0002						
Street Add	ress <u>- 328</u>	Limestone Ro	ad	587	City Kenansville				
Urban Area	Not in a	ın Urban Are	a	Core-based St	atistical Area No	ne			
		Enter Exac	t		-84				
					Me	thod o	f Measuring		
In Decimal Degr	ees	In I	Decimal D	egrees	Other (explain		xplanation: <u>Google</u> rth		
Elevation Abo	ve/below	Mean Sea Le	vel (in me	eters)	<u> </u>		40		
Name of nearest	road to in	et probe1	imestone	Road	AD'	T 3400	Year latest available <u>2010</u>		
Name of nearest Comments:	o nearest i major roa	major road (m) d <u>Kenansv</u>	ille Bypas	s (Hwy 24/903)	o nearest major road ADT 2	100	ar latest available <u>2010</u>		
Site located near	electrical	substation/high	voltage po	ower lines?			Yes 🛛 No 🗌		
Distance betwee	to neares	st power pole	w/transfo er tower (n	rmer (m	190 Direction from site to water	tion N tower	NA		
construction ac	tivities, fa		rants, and	I swimming poo		stacks,	vents, railroad tracks,		
Paramet			ring Obje	ective	Scale		Site Type		
NA SO2 (NAA SO2 (trace NO4 (NA HSNO4 ) O3 NH3 Hydrocart Air Toxice HSCO (N	-level) AQS) oon s ot Micro)	General/E Highest C Max O3 ( Populatio Source O Transport Upwind E Welfare F	Concentrati Concentrat in Exposur riented	on   \[ \]\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	ficrofiddle feighborhood frban egional		LAMS CORE PM PM/OPN ONREGULATORY		
Probe inlet heig Distance of prob Actual measured Distance of prob Is probe > 20 m	ht (from gr be inlet fro d distance be inlet fro from the r	m horizontal (w from probe to so m other monito learest tree drip	rall) and/or upporting ring probe line? Y	r vertical (roof) su structure (meters) inlets > 1 m? es	pporting structure > answer *'d questions	l m?	om ground (meters) Yes		
*Distance from *Height of tree	probe to tr (m)	ee (m)		ee acts as an obstro	_ Direction from p		tree		
*Identify obstac	le I n inlet pro	distance from probe to obstacle a	robe inlet (	m)Direction the control of the height that t	on from probe inlet t	above	the probe? Yes 🔲 No 🗀		

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Parameters	Monitoring Objective	Scale	Site Type
NA □CO (Micro Only)	Highest Concentration Population Exposure Source Oriented Transport Welfare Related Impacts	Micro	SLAMS SPM_OPN NONREGULATORY
Probe inlet height (from gr Actual measured distance	round) 2.5 - 3.5 m? from probe inlet to ground (meters) _		Yes No
Distance of probe inlet fro Actual measured distance	m horizontal (wall) and/or vertical (ro from probe to supporting structure (m	oof) supporting structure eters)	> 1 m? Yes  No
Distance of probe inlet to	nearest intersection > 10 m? nearest traffic lane 2 - 10 m? nearest tree drip line? Yes	o \ (answer *\d anestic	Yes No Yes No No
*Is probe > 10 m from the *Distance from probe to tr *Height of tree (m)	nearest tree drip line if tree acts as an ee (m)	obstruction? Yes Direction from	*No 🗌
*Identify obstacle I *Is distance from inlet pro	air flow? *Yes (answer *'d questi Distance from probe inlet (m)  be to obstacle at least twice the height st traffic lane (m)  Direction fr	Direction from probe inle t that the obstacle protrue	des above the probe? Yes 🔲 No 🔲
Parameters	Monitoring Objective	Scale	Site Type
NA NO <sub>y</sub> (trace-level)	General/Background Highest Concentration Max O3 Concentration Population Exposure Source Oriented Transport Upwind Background Welfare Related Impacts	Micro	SLAMS NCORE SPM
Probe inlet height (from gr Actual measured distance			Yes No
	m horizontal and/or vertical supporting from probe to supporting structure (m	7/	Yes No
Distance of probe inlet from other monitoring probe inlets > 1 m?			Yes No NA
070	nearest tree drip line? Yes 6 °N nearest tree drip line if tree acts as an ee (m)	obstruction? Yes	
Are there any obstacles to  *Identify obstacle I  *Is distance from inlet pro	air flow? *Yes (answer *'d questi Distance from probe inlet (m)] be to obstacle at least twice the height st traffic lane (m) Direction	Direction from probe inle t that the obstacle protrue	des above the probe? Yes 🔲 No 🗌

Parameters	Monitoring Objective	Scale	Site Type
NA  NO₂ (Near Road only)  CO (Near Road only)	Highest Concentration Population Exposure Source Oriented Transport Welfare Related Impacts	Micro	SLAMS SPM NONREGULATORY
Distance of probe inlet from h Actual measured distance from	d) 2-15 m? Yes No No orizontal (wall) and/or vertical (room probe to supporting structure (mether monitoring probe inlets > 1 m	of) supporting structure > eters)	경영 경우 (사이) 아이 아이트 100kg (100kg 100kg 1
*Is probe > 10 m from the nea *Distance from probe to tree ( *Height of tree (m)	est tree drip line? Yes "No rest tree drip line if tree acts as an m)	obstruction? Yes Direction from	"No 🔲
*Identify obstacle Dista *Is distance from inlet probe to	low? *Yes [ (answer °'d questic ince from probe inlet (m)Dir to obstacle at least twice the height affic lane (m) Direction	ection from probe inlet to that the obstacle protrude	es above the probe? Yes 🔲 No 🔲
Parameters	Monitoring Objective	Scale	Site Type
Air flow > 200 L/min PM10 STSP SP SP	Highest Concentration  Population Exposure  Source Oriented  Background  Iransport  Welfare Related Impacts	Micro	NCORE
Actual measured distance from Distance of inlet from horizon	d)	or roof) supporting struc	ture > 2 m? Yes No
Distance between collocated P Actual measured distance betw	M-10, TSP or Pb sampler inlets = reen collocated probes (meters) _ lume inlet and any other high or lo	2 to 4 m?	Yes No NA
*Is probe > 10 m from the nea	est tree drip line? Yes °No rest tree drip line if tree acts as an m)	obstruction? Yes	°No □
Are there any obstacles to air to all the state of the st	low? *Yes [ (answer *'d questic mee from probe inlet (m)Dire to obstacle at least twice the height affic lane (m) Direction	ection from probe inlet to that the obstacle protrude	es above the probe? Yes 🔲 No 🔲

Parameters	Monitoring Objective	Scale	Site Type		
□NA	☑General/Background	Micro	SLAMS		
Air flow < 200 L/min	Highest Concentration	☐Middle	□ NCORE		
PM2.5	Population Exposure	Neighborhood	□SPM		
☐ PM10 ☐ PM10-2.5			NONREGULATORY		
PM10 Lead (PB)	Source Oriented	Urban			
PM2.5 Cont. (TEOM)	Transport	⊠Regional	125		
☐ PM2.5 Cont. (BAM) ☐ PM2.5 Spec. (SASS)	Upwind Background				
PM2.5 Spec. (URG)	■ Welfare Related Impacts				
PM2.5 Cont. Spec.	EVV				
Probe inlet height (from ground) $\square$ < 2 m $\square$ 2-7m $\square$ 7-15 m $\square$ > 15 m $\square$ Actual measured distance from probe inlet to ground (meters) $\square$ 2.4					
	ontal (wall) and/or vertical (platform or		m? Yes ☑ No ☐		
site = 1 m or greater?					
or greater?	olume monitor inlets and any Hi-Volum		Yes ☐ No ☐ NA ☒		
TEOM, BAM & TEOM) Lo	tors (Two FRMs, FRM & BAM, FRM ) exated at Site?	&Yes ☐ (answer	**d questions) No 🗌 NA 🛛		
*Distance between collocate	*Distance between collocated PM 2.5 sampler inlets = 1 to 4 m? Yes No Give actual (meters)				
*Are collocated PM2.5 sam	pler inlets within 1 m vertically of each	other? Yes No	Give actual (meters)		
	llocated with a SASS monitor at the site				
	ed speciation sampler inlets = 1 to 4 m sampler inlets within 1 m vertically of e		Give actual (meters) Give actual (meters)		
Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5?					
*Distance between collocated PM10 and PM2.5 inlets for PM10-2.5 samplers = 1 to 4 m? Yes No No No Service PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes No (answer *'d questions)					
50.	earest tree drip line if tree acts as an ob-				
*Distance from probe to tree (m) Direction from probe to tree					
*Height of tree (m)	ir flow? *Yes (answer *'d questions	i No 🔽			
			and a		
*Identify obstacle Distance from probe inlet (m)Direction from probe inlet to obstacle *Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes \ No \					
Distance of probe to nearest traffic lane (m) 375 Direction from probe to nearest traffic lane ENE					
RECOMMENDATIONS:	1888 - 98-10				
1) Maintain current site sta	atus? Yes 🛛 *No 🗌 (answer *'d o	questions)			
*2) Change monitoring of	ojective? Yes 🗌 (enter new objective		_) No <b>⊠</b> -		
*3) Change scale of repres	sentativeness? Yes 🔲 (enter new sca	ale	) No 🛛		
*4) Relocate site? Yes [	□ No 🛛				
Comments:					
ReviewerTon	y Sabetti	Date	December 28, 2011		
Ambient Monitoring Coord	dinator Tony Sabetti		Date12/28/2011		
Revised 2012-01-19					

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#### **Appendix G-2. Scale of Representativeness**

Each station in the monitoring network must be described in terms of the physical dimensions of the air parcel nearest the monitoring station throughout which actual pollutant concentrations are reasonably similar. Area dimensions or scales of representativeness used in the network description are:

- a) Microscale defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.
- b) Middle scale defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.
- c) Neighborhood scale defines concentrations within an extended area of a city that has relatively uniform land use with dimensions ranging from about 0.5 to 4.0 kilometers.
- d) Urban scale defines an overall citywide condition with dimensions on the order of 4 to 50 kilometers.
- e) Regional Scale defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

Closely associated with the area around the monitoring station where pollutant concentrations are reasonably similar are the basic monitoring exposures of the station.

#### There are six basic exposures:

- a) Sites located to determine the highest concentrations expected to occur in the area covered by the network.
- b) Sites located to determine representative concentrations in areas of high population density.
- Sites located to determine the impact on ambient pollution levels of significant sources or source categories.
- d) Sites located to determine general background concentration levels.
- e) Sites located to determine the extent of regional pollutant transport among populated areas.
- f) Sites located to measure air pollution impacts on visibility, vegetation damage, or other welfarebased impacts and in support of secondary standards.

The design intent in siting stations is to correctly match the area dimensions represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the station. The following relationship of the six basic objectives and the scales of representativeness are appropriate when siting monitoring stations:

**Table 2. Site Type Appropriate Siting Scales** 

	y per i ppi opi i ace e i i i i g	
1. Highest concentration	Micro, middle, neighborhood (sometimes urban	
	or regional for secondarily formed pollutants)	
2. Population oriented	Neighborhood, urban	
3. Source impact	Micro, middle, neighborhood	
4. General/background & regional transport	Urban, regional	
5. Welfare-related impacts	Urban, regional	